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Subject: Evaluation of Reduced Fish Entrainment Effects from CALFED Delta Conveyance Alternatives

One of the major themes that needs emphasis in selecting and refining a CALFED Delta Conveyance Alternative is the opportunity to separate channels that provide major fish habitat and migration pathways functions from those which allow through-Delta transport of water supply. More attention should be focused on the habitat value provided by various Delta channels (i.e., existing or modified) and the possibility of isolating these habitat areas from the effects of "tidal entrainment" and movement towards the export pumps and other Delta water diversions. This separation can be accomplished by various channel modifications (i.e. widening, deepening, or tidal gate installation). The possibilities for exerting greater control over Delta channel flows and circulation patterns should be explored to refine the selected CALFED Alternative.

The refinement of the selected CALFED Delta conveyance alternatives can be supported by a more detailed simulation and evaluation of potential flow related fish movement and entrainment effects. These potential entrainment effects are related to the probability that vulnerable fish life-stages will be transported from their habitat locations towards the export pumping plants or other Delta diversions. The tidal entrainment and transport processes depend on the specific details of the lateral channel geometry (i.e., riparian margins, channel islands, and sloughs) and on the tidal channel flows that depend on the Delta channel geometry and flow control structures. The lateral channel geometry features may be modified using set-back levees and island restoration techniques to enhance the habitat values of selected channels, or by dredging to enhance the conveyance capacity of other channels. The channel flows in both habitat and transport channels can be managed by tidal gates, weirs, and dredging activities.

The average channel flows have been adequately simulated with the existing tidal hydrodynamic models, but the lateral habitat features are not directly included in the Delta hydrodynamic models. We propose to work cooperatively with DWR to simulate the likely distribution of vulnerable life-stages of fish within the currently modeled Delta channels so that the lateral movement into the main channel can be estimated as a function of flow in each channel. This lateral movement can be assumed to be proportional to the channel velocity, but to be reduced by large overbank or slough areas

(i.e., tidal exchange velocity). The mechanics of these lateral fish habitat flows will be described and these estimated habitat area characteristics will be linked with the existing DSM and particle tracking models to provide "sources" of vulnerable life-stages. This procedure will be analogous to the computation of Delta island diversions and drainage flows for agricultural lands within the Delta.

By simulating alternative channel geometry (i.e., flooding, set-back levees, channel island, or dredging options) and alternative channel flow controls (i.e., increased conveyance, barrier operations, or tidal gates), the likely effects of the proposed flow and circulation changes that are included as initial CALFED implementation actions can be more clearly demonstrated. For example, effects from the Head of Old River and south Delta barriers on chinook salmon, splittail, and delta smelt entrainment can be simulated. As another example, the effects of the proposed screened Hood diversion on movement of chinook salmon and Delta smelt from the lower Sacramento and lower San Joaquin channel habitats can be compared. Shifting the majority of cross-Delta conveyance between various Mokelumne channels or between Old River and Middle River/Victoria canal will modify the likely movement of delta smelt from Franks Tract and lower San Joaquin channel habitats. This work would extend the particle tracking results already provided in the Draft EIS/EIR and Phase II reports.

Because the existing DSM and particle tracking models can be used for this analysis, we propose to accomplish this work in cooperation with DWR staff within the December 1998 time frame (i.e., 3-4 month analysis) so that the results can be used in the Final EIR/EIS documents and public meetings. Please call us to schedule a short meeting to discuss this proposed task further.